

Perioperative surgical home models and enhanced recovery after surgery

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Abstract

In recent years, numerous initiatives have been introduced to address changes in health-care costs, delivery methods, reimbursements, and the health-care needs of our aging population. The American Society of Anesthesiologists (ASA) defines the Perioperative Surgical Home (PSH) as a patient-centric, team-based model of care to help meet the demands of a rapidly approaching health-care paradigm emphasizing value, patient satisfaction, and a reduction in costs. Enhanced recovery pathways were initially established by a group of surgeons from Europe who formed a research group with the aim to explore the ultimate care pathway for patients undergoing colonic resections. Similar protocols were later expanded to various surgical specialties with promising outcomes. A PubMed and World Wide Web search was performed with the following key words: "ERAS®," "enhanced recovery after surgery," "PSH," "perioperative surgical home," "protocols," "outcomes." Articles found were published over a 20-year time range (1997-2017). In the present investigation, the most common elements of enhanced recovery protocols are reviewed. Review of how existence of a PSH model facilitates the creation of an enhanced recovery protocol and improves cost-efficiency, patient satisfaction, and clinical outcomes observed in enhanced recovery studies that are applicable to health-care systems universally is described.

Keywords: Enhanced recovery pathways, perioperative surgical home, surgical recovery

Introduction

The American Society of Anesthesiologists (ASA) describes the perioperative surgical home model as a "patient-centric, team-based model of care created by leaders within the American Society of Anesthesiologists to help meet the demands of a rapidly approaching health care paradigm that will emphasize value, patient satisfaction, and reduced costs."^[1] The Perioperative Surgical Home (PSH) and Enhanced Recovery After Surgery (ERAS)® initiatives

were developed in different parts of the world, with similar but distinct goals. The ERAS initiative was pioneered by Kehlet *et al.* in Denmark (1997), with his groundbreaking work on fast-track surgery showing that most patients had recovered enough to be discharged 2 days after open sigmoid colon resections. This was at a time when the length of stay for these operations was 10 days or more in most countries.^[1] These protocols were later expanded to other surgical specialties with some resistance from the medical community, coupled with promising results. Finding that the guidelines could be implemented in a structured way with prompt improvement in results, it was subsequently decided that a major effort was

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needed to help spread ERAS concepts more widely alongside further development of research. This formed the basis for the ERAS Society which was created officially and registered in Sweden in 2010 (www.erassociety.org).

The PSH was proposed by the ASA and other stakeholders as an innovative, patient-centered, surgical continuity of care model that incorporates shared decision-making.^[12] The need for such a model serves to build on the gains made by the anesthesiology community in patient safety, improve coordination of care between various providers who care for patients during the perioperative period, and, finally, and to make financial sense in the bundle payment, patient outcome, and satisfaction-based reimbursement system. The initiatives stemming from different clinical needs would serve their respective purposes in a more efficient way if ERAS protocols existed within a PSH, facilitating efficient care delivery systems by coordination between providers caring for the surgical patient in the preoperative, intraoperative, early and late postoperative phases.

Overall key points of ERAS and PSH are as follows:^[3]

- ERAS programs are evidence-based multimodal interventions that achieve early postoperative recovery
- PSH was introduced as an organizing idea for ERAS pathways and perioperative medicine
- PSH is proposed as a patient-centered, team-based system of care developed by the ASA
- The goals of the PSH are to improve patient satisfaction, improve the quality of perioperative care delivered, and reduce the cost of surgical care.

Enhanced Recovery after Surgery in the Preoperative Phase of Care

Patient preparation for an upcoming surgery includes patient counseling, education, lifestyle modifications, and extends into the immediate preoperative period with newer preoperative fasting protocols. Successful implementation of these protocols requires collaborative efforts between surgeons, anesthesiologists, dietitians, physical medicine and rehabilitation professionals, psychiatrists, psychologists, and pharmacists to name a few. Since the ideal PSH contains leaders from each of these respective fields, it would be integral for timely development and continued data collection, leading to improvement of these protocols based on outcomes.

Patient Counseling and Education

Patients that are given preoperative information and/or a visit to the surgery center exhibit reduced anxiety, improved compliance

with postoperative instructions, improved postoperative recovery, decreased length of stay, and improved long-term outcomes.^[2,4-7] Furthermore, preoperative psychological counseling can reduce fatigue and surgery-associated stress while also improving postoperative wound healing.^[8] Shared decision-making is another important component of improved patient outcomes, successful healthcare, and ERAS. When a difficult decision must be made by the patient, they should be encouraged to contact family and/or friends or other health-care providers so that they can make a decision that best aligns with their values.^[9]

Preoperative Lifestyle Modification

Variables that are modifiable within this group include weight loss, exercise preconditioning, and tobacco and alcohol cessation among other more procedure-specific variables. Prehabilitation comprises preoperative physical conditioning to improve functional and physiological capacity in order to enable patients to recover sooner after surgical stress.^[10,11] There is evidence that preoperative psychological interventions can improve postoperative psychological status and enhance recovery. Furthermore, preoperative psychological interventions are also associated with a decrease in postoperative complications and a decreased length of hospital stay. A 2011 review evaluated studies investigating preoperative exercise therapy on postoperative complications and length of stay for all types of surgery and found that prehabilitation reduced complications and length of hospital stay.^[12] A separate study reported that a 2–4-week preoperative low calorie diet (1000–1200 kcal/day) or a very low calorie diet (800 kcal/day) is recommended for bariatric surgery and is associated with enhanced recovery. These low calorie diets can reduce liver volume up to 20%.^[13-15]

Fasting Protocols

The most common element of ERAS protocols in this area is the introduction of a carbohydrate loading. Clear liquid can be administered up to 2 h preoperatively. Preoperative conditioning that utilizes carbohydrate drinks is associated with a significant reduction in the length of hospital stay.^[16]

Enhanced Recovery after Surgery in the Intraoperative Phase of Care

Examples of ERAS protocols in intraoperative care include multimodal analgesia, goal-directed fluid therapy, choice of anesthesia type specific to outcomes pursued, and postoperative nausea and vomiting (PONV) prophylaxis. In examining the three examples below, it is apparent that the

ERAS team involved in planning this phase should include surgeons, anesthesiologists, preoperative evaluation clinic staff, pharmacists, nursing, information technology as well as anesthesia technicians. Leaders from these departments who are members in the PSH would be tasked with the development and oversight of practice of these protocols.

Multimodal Analgesia

The planning of a multimodal analgesia protocol starts in the patient's evaluation in the preoperative evaluation clinic (PEC) appointment. The PEC also educates patients on different modalities that will be used perioperatively and obtains informed patient consent for a neuraxial or regional anesthetic or analgesic procedure. Regional techniques have been shown to increase postsurgical patient outcomes and decrease narcotic consumption. Integration of care via the PSH model ensures that the PEC clinic manages anticoagulation medications, promoting the safe performance of neuraxial blockade, as well as a discussion with the patient about the advantages and disadvantages of each technique. The clinic may also electronically order appropriate multimodal medications to take by mouth before surgery or in the same-day surgery unit (e.g., acetaminophen, celecoxib, and gabapentin).

Indeed, these protocols focused on multimodal analgesia extend into the intraoperative and postoperative periods, with emphasis on opioid sparing and opioid-free regimens. Recently, some institutions have maximally applied this principle with the creation of intraoperative opioid-free anesthesia (OFA) protocols. OFA aims to eliminate the adverse effects of opioids utilized in traditional, balanced anesthetics while still providing adequate anesthesia and analgesia.^[17] This is accomplished in some protocols by completely replacing intraoperative opioids with a combination of nonopioid adjuncts such as ketamine, dexmedetomidine, and lidocaine.^[18]

Applied at a large scale, perioperative multimodal analgesia protocols may one day serve to address the growing problem of opioid dependence in the community, especially if future efforts are undertaken to minimize not only perioperative opioid administration but change provider practices when prescribing opioids upon patient discharge.

Goal Directed Fluid Therapy

Individualized goal-directed fluid therapy (GDFT) is an integral and common element of ERAS in preoperative, intraoperative, and postoperative phases with a goal of maintaining euvolemia. For low-risk patients undergoing

low-risk surgery, a “zero-balance” approach is usually sufficient. For patients undergoing major surgery, individualized GDFT is recommended and should be based on surgical and patient risk factors. It has been demonstrated that GDFT is associated with a significant reduction in morbidity, hospital length of stay, and intensive care length of stay.^[19,20]

Postoperative Nausea and Vomiting Prophylaxis

Similar to planning of multimodal analgesia regimens, PONV prophylaxis starts with risk stratification in the PEC. The practitioner then electronically orders pre- and postoperative remedies on the day of the evaluation. As with most ERAS elements, a feedback mechanism is built in the electronic health record for data collection and regimen modification based on clinical outcome and other patient- and hospital-specific factors.

Enhanced Recovery after Surgery in the Postoperative Phase

Patient complications can result from inadequate postoperative communication and handoffs. With institutional focus on operating room productivity, immediate and early postoperative care is generally provided by more junior surgical team members. While the anesthesiologist is responsible for medical issue management preoperatively, intraoperatively, and in the immediate postoperative care in the postanesthesia care unit (PACU), these are then delegated to the surgical primary team, frequently without a physician-to-physician handoff (transfer of care) taking place at the conclusion of PACU stay.

Vetter *et al.* proposed a PSH model where an anesthesia intensivist, working with a team of midlevel providers, is tasked with provision of more focused and integrated postoperative care extending from the PACU to the intensive care unit and to regular inpatient units. This team communicates closely with the surgical team and acute pain anesthesia teams in order to ease transition into oral, multimodal pain control regimens. Overall, continuity of care enhances the postoperative patient experience and reduces patient and family anxiety.

Important Points

The literature contains multiple examples of ERAS protocols specific to surgical procedures or groups of procedures within various surgical specialties. Certain points need to be emphasized prior to a discussion about implementation of ERAS within the PSH:

1. The PSH is an organizational entity. It can be conceptualized as an organizational “umbrella,” under which its various components and elements are logically positioned, embedded, and orchestrated
2. ERAS protocols are patient, patient population, procedure, or subspecialty-specific
3. ERAS protocol design starts by identifying motivated project leaders drawn from the organization’s cadre of anesthesiologists, surgeons, and perioperative nursing. Other important stakeholders and team members include hospital administrators, other physician consultants, nutritionists, pharmacists, physical and occupational therapists, and social workers^[21]
4. Ideally, PSH personnel within an institution include leaders from the groups mentioned in No. 3 (above), who would support and assist in design and implementation of an ERAS proposed protocol.

Therefore, creation of an ERAS protocol for a particular patient or patient population is in and of itself facilitated by the existence of a PSH within that institution as it already includes a framework of collaboration between the various physician and nonphysician groups within it. Once the individuals/departments involved are recognized, collaboration and communication begin culminating in the establishment of an ERAS team appropriate for the creation of the project protocol at hand.

This ERAS team is then tasked to review available literature and to formulate surgical service or procedure-specific ERAS program(s) to be implemented. Each member is expected to identify and promote the role of his/her specialty in the program.^[21] Clearly, various elements of the protocols involved are going to be procedure and patient specific. ERAS interventions can be broadly categorized into preoperative (early and day of service), intraoperative, and postoperative (early and late) protocols to streamline care delivery, cost, efficiency, patient satisfaction, and clinical outcomes.

Conclusion

In the present investigation, the basic structure of a PSH as proposed by the ASA has been reviewed. A more in-depth look at common elements of ERAS protocols and the personnel involved has revealed that most (if not all) personnel within ERAS protocols are under the leadership of individuals within the PSH. The authors of this review believe that the time has come for the anesthesia community to fully appreciate this relationship and take advantage of it when establishing ERAS protocols for a particular patient

or patient population. Effective implementation of ERAS protocols requires anesthesia providers to be involved in a longitudinal care model which is different from the traditional methods of anesthesia providers’ practice. This may require the physician anesthesiologist to step out of the immediate perioperative “comfort zone.” In the bundled payments and outcome-driven compensation models being used in the United States today, it is integral for the survival of an institution to be cognizant of these factors and address changes efficiently by being one step ahead of an upcoming shift in practice. The PSH provides a great medium where leaders of perioperative care collaborate to improve efficiency and clinical outcomes. Since the ERAS protocols were created to achieve the same goals in a more individualized fashion, it would be very beneficial to start the conversations about ERAS protocols development within the PSH, which by definition contains the personnel and collects data that can be used to design, implement, and modify an ERAS protocol, leading to data sharing and new standards of care development.

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Conflicts of interest

There are no conflicts of interest.

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